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PREFACE

Four years ago, at the time of 35th IGC at Cape Town the INSA–IUGS Committee presented a comprehensive document of the Indian initiatives and achievements in the field of various geoscience programs. With 36th IGC in our home soil, it is imperative that we present a comprehensive compendium of the Indian contribution to the field of geoscience, restricting our documentation to the last 4 to 5 years. In our last report we had stated that "the past decade has seen substantive progress in the growth of research in Earth System Sciences in India, and can be considered truly an unprecedented decade of "abundant resources being made available to the community". The successful march continues and many new initiatives have been show-cased in various national and international fora. New progress that occurred in this period prompts us to make this statement. The legacy of the earlier years acted as a bridge to the new initiatives that implied a paradigm shift in Indian approach to tackle the unsolved problems in geoscience. The success story of multidisciplinary Mars Mission is known to the world. It is expected that the results of studies on the Martian surface and atmosphere will be available soon. Contributions to the remote sensing missions, taking a lead on the studies in the Arctic, undertaking several modeling and forecasting programs, quantifying the stratigraphic records by advanced structural, mineralogical, petrological, sedimentological and geochemical techniques have put the Indian geoscience community at an elevated level.

With increased funding and creation of excellent laboratory facilities and several core laboratories, the nature of reporting of geological data showed paradigm shifts towards global standard. Large scale funding of sophisticated experimental facilities made high-end mass spectrometric, chemical and other geochemical analytical facilities within reach of the youngest of the researcher. Scientific relevance of the National Centre for Tsunami Early Warning, the Institute for Seismological Research, Centre for Glaciology, Inter-University UGC Accelerator Centre with wide spectrum of dating facilities and installation of advance Mass Spectrometers in several research institutes cannot be overlooked. Seismic micro-zonation of the entire country, strategic mineral exploration, hydrocarbon exploration through coal-bed methane and gas-hydrates and shale-gas are underway in mission modes. International Ocean Drilling program with Indian proposals for deep drill cores in the Arabian Sea and the Bay of Bengal is progressing well and aimed at creating better understanding of the Indian monsoon and Recent Earth History. Continental deep drilling at Koyna through an earthquake fault zone has provided wealth of geophysical, geological and geochemical data. This major drilling program has established physical and chemical parameters in the "near-field zone", typically before and after an earthquake to understand seismicity patterns. Acquisition of new ocean-going ships exclusively for scientific research and mapping have added ammunition to our ocean related research. Pro-active scientific collaborations within and outside the country has synergized the integration of various disciplines improving the multidisciplinary dimension of Geo-sciences.

Dimension of Geosciences have increased manifold. It now plays significant role in the food security (fertilizer minerals), energy security (hydrocarbon, coal and strategic minerals, hydro-electricity, radioactivity), water security (groundwater, dam building) and urban security (rock foundation, environmental monitoring). The Ministry of Earth Sciences is expanding its activities with a broad vision of providing Earth Science Services to the society in all the Earth Science domains and in strengthening the basic research base. The Department of Science and Technology, the Ministry of Mines with Geological Survey of India and several dedicated government funded geosciences institutions along with hydrocarbon exploration organizations like ONGC and OIL INDIA provide a good frame work for the growth of geosciences in the country.

The present volume presents an overview of the work done in India on a set of selected themes. These Status Reports cover the work done in India during the last 5 years and we hope serves as a window into the contemporary Indian geosciences. A few articles are exhaustive reviews and not just status reports. These reports are only indicative of state of progress made in short period of time, hence are by no means exhaustive. *The articles have been serialized with respect to the geological age beginning with the report on the Archean and then going down progressively in the stratigraphic ladder and then by the process based themes.* A total of fifty one Status Reports-Reviews and eight Institutional Reports have been included in this Special Issue for the 36th IGC.

D Mukhopadhyay and A Matin presented an updated status on the different lithotectonic groups of the Singhbhum Craton with respect to sedimentation, magmatism, metamorphism and geochemical signatures (including a wide range of isotopes) to look into the geodynamic evolution right from the Hadean to Proterozoic time. These rocks provide valuable clues regarding the transition from vertical to modern-style plate tectonics and regarding existence of enriched mantle reservoirs in the early earth. Paleomagnetic data on dyke swarms allow correlation with similar swarms in other cratonic blocks. **C Manikyamba and S Ganguly** synthesize the new results of structural, petrological, geochemical and geochronological studies on the Dharwar Craton to emphasize the importance of an integrated approach to study the geodynamic transition related to secular variation of the Earth over a protracted period from Mesoarchean to Paleoproterozoic. **J K Pati and A K Singh** bring out a summary of recent documentations of crustal scale tectonic zones with or without greenstone belts in the Bundelkhand Craton and highlight the importance of the craton in understanding Paleoarchean events in the early cratonic nuclei of the Indian subcontinent. **M E A Mondal, I Ahmad, M S Rahaman, R Bhutani, and T Ahmad** have summarized the contemporary understanding of the stratigraphy, and tectonics of the Aravalli Craton represented by the Aravalli and Delhi Supergroups resting on the basement rocks of the Banded Gneissic complex. Controversies about the stratigraphy, structural deformation, tectonothermal events and tectonic models have been highlighted. Suggestions for implementation of an acceptable stratigraphic scheme have been made. **V Ravikant, and N V Chalapathi Rao** present an integrated summary of geological evolution of the Bastar Craton beginning with the Paleoarchean TTG gneisses, through the early Neoarchean Sonakhan greenstone belt (highlighting similarities with the Eastern Dharwar Craton), to intrusive granites and sedimentary cover sequences in the Archean Proterozoic transition and Paleoproterozoic mafic dyke systems.

S Bose strengthens the concept of Indo-Antarctic correlation where the Eastern Ghats Belt played an important role right through three supercontinent assemblies, viz: Columbia, Rodinia and East Gondwana, highlighting that the belt is a collage of different tectono-metamorphic domains. Recent work has shown that the Indian crustal assembly was completed in the Paleozoic. **A Chattopadhyay** analyzed a large amount of recently acquired geological, geochemical and geochronological data on the Central Indian Tectonic Zone in the context of intercontinental correlation and amalgamation of different crustal blocks to produce the present architecture of India. **B Maibam** have discussed Precambrian rocks of Arunachal Pradesh, Assam and Meghalaya which have been studied mostly by reconnaissance-type work. The role of Mesoproterozoic and Lower Paleozoic granitoids in the evolution of the Meghalaya Plateau and the Karbi Anglong, U–Pb SHRIMP zircon ages of the granitoids and granites of the Mikir Hills, South Khasi Hill granite, magmatic enclaves of Nongpoh granitoids, granite plutons of Dizo valley, Bomdila granite gneiss and Subansiri region have been highlighted.

P Basu and R Chakrabarti discussed radiometric ages, various contradictions in ages determined by different isotopic methods organic life preserved in the rocks and paleomagnetism of the Vindhyan Supergroup. They also discussed paleocurrents, provenance, regional correlation and tectonic evolution of the Vindhyan basin using geochemical, geophysical, petrological evidence. **P P Chakraborty and R Barkat** have collated new geological studies carried on in the Proterozoic Chhattisgarh, Indravati, Kurnool and Bhima Proterozoic basins. It has highlighted the proposition of the new stratigraphic units, the Kharsiya Group and Singhora, Chandarpur, Raipur and Kharsiya

Formations in Chhattisgarh geology. Geochronology of tuff beds in Chhattisgarh and Indravati succession helped in making effective correlations. The elusive Kurnool basin, microfossil assemblages, glaciation in the Bhima basin and depositional set up have been discussed. **V S Kale** made an exhaustive review of the sedimentary sequences and associated magmatic rocks from the Cuddapah basin and adjoining fold belts on the eastern margin of the Dharwar craton of Peninsular India. He suggested modification of several traditional views and urged the need for re-examination of this region in light of the emerging models of Proterozoic supercontinental assembly and break-up.

V Ravikanti and N C Pant evaluate scantily preserved pre-Cenozoic records in the Himalyan orogen and conclude that evidence of Paleoproterozoic, Tonian and early Cambrian events are identified that obviously occurred in the leading edge of the Indian Plate. The last event is important to deduce geodynamic implications, as well as biotic evolution. **S Kumar, N C Hughes, P M Myrow, V C Tewari, O N Bhargava and B P Singh** summarised the work done on stratigraphy and biostratigraphy of the Proterozoic sedimentary deposits of Himalaya. Progress in the paleoclimatic studies and correlation of these stratgraphic units on the basis of lithology, structural setting, isotope geochemistry, microbial life, stromatolites and stable isotopes of the pre-Ediacaran sediments of the NW and NE Himalaya have been discussed. **S Gupta and N Bose** discuss recent developments on the structural and metamorphic evolution on the Eastern Himalayas and Arunachal Pradesh, collate with geophysical data and highlight new geochronological data characterizing petrological events. **A K Jain, V C Thakur, M Joshi, P K Mukherjee, R C Patel, K Bhattacharya, S Singhal, K K Agarwal, R Dixit, G Deshmukh, and Man Mohan** collated extensive research in the Himalayan Orogen including field mapping, structural analysis, geochemistry, metamorphic and igneous petrology, stratigraphy and paleontology, Ar/Ar and U–Pb geochronology, besides low-temperature thermochronology throughout the belt from western sector through Garhwal-Kumaon, Sikkim, Bhutan and Arunachal Pradesh. High-resolution U–Pb ages provided impetus to model Himalayan tectonics, besides modelling its Paleoproterozoic and Neoproterozoic configuration. **S Singh, S Kumar, P Gupta, S Singh and A Sahu** discussed the age and characteristics of the xenoliths of porphyritic andesite and dacite within the Tiritgranitoids of the Nubra valley of Trans-Himalaya. Several U–Pb zircon ages determined by SHRIMP and LAMC-ICP-MS for the Dalhousie and Dhauladhar granite, the Higher Himalayan Crystallines along the Bhagirathi Valley, the granitoids of the Alaknanda-Dhauliganga valley, the granite-granodiorites of the Askot Klippe and volcanic rock in the Berinag quartzite have been discussed. Paleomagnetic studies on the mafic, tholeiitic dikes in Nainital, Almora and Pithoragarh in the Lesser Himalaya helped in interpreting the paleo-locations. **O N Bhargava, B P Singh, B Pandey, J Ganai, G M Bhat, S K Prasad and R Rashid** provided a review of the recent literature pertaining to the entire Tethyan Himalaya and parts of the Cambrian and Permian and late Cretaceous of the Lesser Himalaya. Debate on the Cambrian succession of the Spiti region (Parahio Valley Section and Kunzam La section) has been included in this review. The Paleozoic setup of the Zanskar basin show similarities with the hydrocarbon rich Peshawar Basin. Thick Palaeozoic and the Mesozoic argillite successions of the Kashmir, Zanskar, Chamba and Spiti basins have been discussed as the potential hydrocarbon source rocks. **S Bajpai, B P Singh, R Patnaik, G Srivastava and V Parmar** discuss the recent fossil, paleoclimatic and paleoenvironmental advances from Himalayan Cenozoic sequences. This article, based on the contributions made by five authors and their co-workers, focuses on the Himalayan foreland including paleosols, Siwalik mammals including hominoids, and the Neogene floras with valuable quantitative insights in to paleotemperature and paleoprecipitation.

S Mukherjee, G Dole, V Yatheesh and V S Kale have put forward a comprehensive account of major shear systems in the Deccan province to evaluate their significance in the India- Madagascar breakup, extinct spreading centres and correlation with spreading rates. They discuss the manifestations of early Deccan volcanism at 68.5 MY and late one at 62.5 MY from various onshore and offshore features. **A Kumar, S Pal and J P Shrivastava** have discussed recent studies on the Deccan Traps where petrochemical, Nd-Sr-Pb isotopic, and geochronology studies have been used for inferring the origin, age and duration of volcanism and attendant K/Pg

transition events. Flow-by-flow palaeomagnetic measurements for the Mandla basalt revealed multiple magnetic polarity events. $^{40}Ar/^{39}Ar$ ages for Mundwara and Sarnu-Dandali complex, carbonate dissolution, climatic cooling and late Maastrichtian global warming attendant to Deccan volcanism, induced ocean acidification which led to high environmental stress worldwide have been discussed.

B Mishra assessed the outcome on genetic modeling of chromite, uranium, gold and base metal deposits of India based on recent geochemical investigations and experimental phase equilibrium analysis. **M K Panigrahi and K L Pruseth** show that significant progress has been made in the field of modeling of base metal, gold and other ore deposits with the help of microanalytical data on ore and associated minerals, experimental melting experiments and stable isotope analysis of ore minerals. **M Deb** discussed the sedimentary ore deposits which formed in different environments, and tectonic settings producing both allochthonous and autochthonous deposits. Mechanically concentrated placer and paleo-placer deposits showing concentration of precious and strategic minerals along with precious stones have been briefly reviewed along with chemical precipitates occurring as stratiform metallic and non-metallic deposits. **Y Singh** presented a brief review on new radioactive mineral occurrences brought to light during the period 2017 to 2020. It is noted that new occurrences are located in extension areas of already known provinces / geological settings, where exploration work is under progress.

N V Chalapathi Rao, R K Giri and A Pandey discuss new findings of kimberlites and related rocks as well as xenoliths entrained in them to emphasize how the diversities in the nature of the Indian subcontinental lithospheric mantle with respect to geodynamics and supercontinent cycles have been unraveled. **R K Srivastava, A K Samal, R E Ernst, U Söderlund and R Shankar** presented recent geochemical, geochronology and paleomagnetic research on the Large Igneous Provinces (LIPs) that allow their identification and characterization of distinct generations in space and time in the Indian Shield. This has helped significantly to understand the nature, composition and evolution of the sub-continental lithospheric mantle beneath the Indian Shield, in terms of role of plume tectonics, ancient subduction events, extent of the LIPs paleo-supercontinent reconstructions.

D K Pandey, N Nair and A Kumar reviewed the spectacular passive western continental margin of India which preserves early imprints of the final Gondwana dispersal. The deep post-rift sedimentary archives on this margin for deciphering the India–Eurasia collisional tectonics and its long term climatic response have been emphasized. The article collates the recent Indian contributions towards augmenting our knowledge about the evolution of this complex passive margin. **A Mazumdar** in his status report highlighted the research output in sediment dynamics, biogeochemical processes like sulfate reduction/ nitrogen cycle and metal enrichment/ contamination in the coastal sediments in three distinct depositional milieus like estuaries, mangroves, and mud banks. **S Banerjee, P S Ghosh, R Nagendra, B Bhattacharya, B Desai and A K Srivastava** presented a brief appraisal of the present understanding regarding marine and fluvial sedimentation in the Peninsular India in the background of global tectono-thermal events and relative sea level changes during the Phanerozoic. **N Bhatt** discussed the development of coastal landscape as a net result of an equilibrium attained between large numbers of interacting variables Humid, semi-arid and arid Indian coastlines have been covered in this status report of work in recent times. **P Srivastava**, in a comprehensive review article based on studies conducted during the last five years in India, focuses on our understanding of the landscape evolution of river systems in the Ganga plain in terms of climate-tectonic forcing and sensitivity of landscape responses, utilizing high resolution geomorphic mapping, sedimentology, and luminescence chronology. Amongst the most important aspects of recent contributions is the river connectivity between source and sink. **A D Singh, A K Ghosh, R C Mehrotra, R Patnaik and M Tiwari** presented an overview of the recent research work done on the South Asian/Indian monsoon climate variability, based on the Neogene terrestrial and marine proxy records. The paleoclimatic and paleo-oceanographic records have been highlighted in order to better understand the timing of initiation/ intensification of the Indian monsoon system. Its evolution and seasonal variability pattern through time and the underlying mechanisms have been enumerated. The impacts on paleobiogeography of

terrestrial fauna and flora and physico-chemical and biological processes in the Northern Indian Ocean and the Southern Ocean have been discussed in order to decipher the hydrodynamics and biogeochemistry of the system. **B Phartiyal, A Farooqui and T Bose** have reviewed the application of biotic and abiotic proxies to integrate the recent lacustrine records from the Indian subcontinent. They highlight the problems in chronology, quantification, and interpretation with possible implications for future paleoclimate research, and also bring to light the increasing signs of anthropogenic climate change especially in enclosed lake basins. **A Kar** wrote a review article instead of the status report on the aeolian processes and landforms in the Thar Desert. Studies by some dedicated groups, helped by optically stimulated luminescence dating a broad framework of landscape development history during the late Quaternary period has been developed and discussed in this article. The studies so far confirm that climate, especially its oscillations between warm wet and dry cool phases in an overall monsoon domain, was the most dominant driver of landscape development in our desert.

M C Manoj, A Singh, P Verma, P Govil, M Kawsar, P Uddandam and V Prasad present a detailed overview of recent Indian contributions dealing with marine micropalaeontology. This review encompasses surveys of deep time (Jurassic - Neogene) as well as Quaternary sediments, ulitizing marine microfossils including foraminifers, dinoflagellates as well as terrestrial palynomorphs stable isotopes, with focus on global events at the K-Pg boundary and in the early Paleogene.

R J Perumal, R L Mishra, R S Priyanka, R K Yadav, D P Mohanty, A Pandey, I Singh, A Anil and S Dash highlighted active tectonics pertaining to crustal deformations of the Himalaya, the Ganga-Brahmaputra plains and the rift basins of central India. These studies involved trench excavation (paleoseismology), archeoseismological investigations, liquefaction, geodetic strain, tectonic geomorphometry, and neotectonic evolution of landforms using geochronological techniques. Active fault studies from remote north-eastern portion and central seismic gap (CSG) of the Himalaya have provided useful insight into the surface rupture scenario of great devastating earthquakes that occurred during the past. **C P Rajendran, T Singh, M Mukul, M Thakkar, G Ch. Kothyar, B John and K Rajendran** reviewed the paleoseismological and related active fault research to indicate that this field is a now widely accepted tool to characterize the seismic hazard in the country, which provides constraints on the fault geometry and the nature of near-surface crustal deformations, thereby contributing to earthquake hazard evaluations.

D Saha, S Shekhar, S Ali, L Elango, S S Vittala highlighted the hydrogeological diversity of India. The hydrogeologically distinct Himalayan highlands and the Indus-Ganga Brahmaputra system gradually merges with the cratonic provinces of central and south India .Over-exploitation of groundwater resources, deterioration in groundwater quality, declining well yield, sustainable use of groundwater resource and the need to map and understand the aquifer system have been highlighted. **R Singh, V Mishra, B Narasimhan, S Ghosh, A Sharma, S Dutta and P P Mujumdar** have emphasized the fact that human alteration of the natural environment continues unabated leading to exploitation of natural resources including water. Surface and groundwater modeling, satellite-based model development inclusion of anthropogenic influences in hydrologic models, and uncertainty estimation have been highlighted. **R Kumar, P R Pujari, P Chauhan, S P Agarwal, S K Jain, S Jain, L Elango, P Muduli, C Padmakar, L Deshpande, A Kapley, R Vijay, S Dhyani and P Verma,** reviewed the role of Environmental Science and Remote sensing in the Hydrological applications.

The progress made in individual Institute with the identified investigators been summarized. Need for multi Institutional and Multi-disciplinary approach has been emphasized. **U C Mohanty, M Mohapatra, A Karumuri, Krishnan, J S Chowdhary and P Mukhopadhyay** emphasized the fact that understanding variability of the Indian monsoon system is vital for the economy and agriculture. The two essential elements of the Indian monsoon are - the summer monsoon or southwest monsoon accounts for most of the annual rainfall in India. Internal dynamics of Indian Summer Monsoon (ISM), different climate modes, effect on the employment in agriculture and allied sectors have been discussed.

W K Mohanty and B Sahoo discussed

progress in the field of various Shallow seismic techniques involving reflection, refraction, borehole and surface wave methods. Application of this technique include examining sedimentology and stratigraphy, detecting subsurface geologic structures, mapping the top of bedrock etc. Its role in delineating the geological and geotechnical features has been highlighted. **G Srijayanthi, M Ravi Kumar, V K Gahalaut** provide a short overview of the seismological research conducted by the Indian researchers pertaining to the Indian subcontinent. This synthesis primarily includes results of studies on crustal architecture, geodynamics, seismotectonics and earthquake source parameters. **R Prakash, G Suresh and V K Gahalaut** enumerated the history of earthquake monitoring for seismological research. Expansion of the Indian national seismological network is discussed with existing 115 state of the art observatories in addition to observatories installed by other research institutes.These are equipped with real time data connectivity which feed data to auto-location software at the headquarter of National Center for Seismology, New Delhi. **M Israil, D Kumar, A Devi and P K Gupta** collated magnetotelluric (MT) field data from Garhwal Himalaya, Sikkim Himalaya; Indo-Gangetic Plain (IGP); Gujrat, Dharwarcraton (DC), Eastern Ghat Mobile Belt (EGMB), North Singhbhum Mobile Belt (NSMB), Central Indian Shear (CIS) zone, Narmada-Son Lineament (NSL), Cuddapah basin, Koyna-Warna and 3D MT inversion software-AP3DMT. The field investigations delineated deep crustal structure, the basement depth geometry, resistivity structure in the Bhuj earthquake region, electrical resistivity characterization of fault zones, mapping of geothermal source zone and lithosphere architecture. **R Mohan, S K Roy, T Meloth, N Anilkumar, K P Krishnan, P Sabu, A Kumar, B S Mahesh, S M Patil, S Venkatachalam and N C Pant** reviewed scientific endeavor in the tripolar realm of the Arctic, Antarctica (including the Southern Ocean) and the Himalayas. Scientific expedition to Antarctica has increasingly covered a very wide spectrum of geological investigations like paleolimnological studies, polar biological sciences, the snow, ice and ice core studies. Later, India has shown its presence in the Ny-Ålesund scientific village, Svalbard in the Arctic. In addition, India launched dedicated expeditions to the Southern Ocean to decipher its hydrodynamics and biogeochemistry.

A K Dwivedi has reviewed the hydrocarbon potential of the sedimentary basins covering an area of 3.36 million sq. km spread over Onland, Shallow water and Deep water sectors. The National Seismic Programme of MoPNG, GoI for Geo-Scientific Data generation in Indian Sedimentary Basins is intended to assess the un-appraised onland areas in 26 sedimentary basins. The project relating to Acquisition, Processing and Interpretation of 2D Seismic Data is being implemented through ONGCL and OIL. A need was felt to revisit the Hydrocarbon Resources. Re-assessment of India was last carried out during 2015-17. **N Vedanti, U Vadapalli and K Sain** summarized the work done on the usage of coal as a source of clean energy to meet the overall objective of a low carbon path. Clean Coal Technology (CCT) as a National Mission Program along with the status of exploration and production of Coal Bed Methane (CBM) and its commercial utilization have been covered in this article.

Y J Bhaskar Rao, S Chopra, P Kumar, P K Mukherjee, S Singhal, V Adlakha, T Vijaya Kumar, B Sreenivas, E V S S K Babu highlighted all new initiatives in recent years to bolster geochronological analytical facilities in India. *In situ* U–Th–Pb Geochronology, Hf and O isotope systematics in zircon are now being performed with a focus on laboratories at the IUAC, WIHG and CSIR-NGRI. **S Roy and B K Bansal** provided an updated account of the deep drilling project of the Ministry of Earth Sciences progressing very satisfactorily in the Koyna region of Maharasthtra.

Several geoscience related institutions provided an account of their research activities in the last five years. Reports were received from the Geological Survey of India, Birbal Sahni Institute of Paleosciences, National Institute of Ocean Technology, National Centre for Ocean Information Services, National Geophysical Research Institute, National Environment Engineering Research Institute, Atomic Minerals Division and National Institute of Advance Studies. These Institutional reports are self-explanatory. Reports from several other national and regional institutes engaged in the study of Earth System Science could not be obtained for this publication.

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status reports and provide knowledgeable reviews. Prof. Ashok K Singhvi, Vice President Science and Society and Chair, INSA IUGS-INQUA Committee kindly asked four of us to collate and edit this Special Issue of PINSA for submission to the IUGS and releasing it at the 36th IGC in Delhi NCR. We thank him for having faith on us. We thank the erstwhile INSA President Prof. Ajay K Sood, Vice President, Publication Affairs Prof. Gadadhar Mishra and Editor-in Chief Prof. Sanjay Puri for giving us complete freedom in managing this special volume of PINSA. We also thank the present President Prof. Chandrima Shaha for her pro-active support. Our appreciation remains for senior INSA functionaries Dr. V K Arora, Shri S P Mishra, Shri Sunil Zokarkar, Sudhanshu Aggarwal, Seema Mandal and Brotati Chattopadhyay for help on different stages of publication. Dr. A K Moitra provided the moral support and guidance all along this activity. Special mention has to be made for the excellent support provided by the Editorial Office Assistant Ms. Richa in processing the manuscripts and interfacing with the press for speedy publication and also to Ms. Shruti looking after the publication of Bibliographic Memoirs.

Guest Editors
Dhiraj Mohan Banerjee
Arvind Kumar Jain
Somnath Dasgupta
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